



Re: Las Vegas   
Ian Gregor to: Michael Huerta  
Cc: "Chris Rocheleau"

08/06/2012 11:14

History

This message has been replied to.

Thanks Michael. Does 7:30 work? I think you have to be at the Mandalay at 8:30 to meet with Paul McDuffee ...

Ian Gregor  
Public Affairs Manager  
FAA Pacific Division  
(310) 725-3580 (office)  


Michael Huerta

From: Michael Huerta/AWA/FAA To: "Ian Gregor..."

08/06/2012 08:10:03 AM

From: Michael Huerta/AWA/FAA  
To: "Ian Gregor" <Ian.Gregor@faa.gov>,  
Cc: "Chris Rocheleau" <Chris.Rocheleau@faa.gov>  
Date: 08/06/2012 08:10 AM  
Subject: Re: Las Vegas


Hi Ian,

We are at the Luxor as well. We can meet for breakfast. I have copied Chris as well. Let me know what time.

Michael

Sent from my iPad

On Aug 6, 2012, at 7:33 AM, "Ian Gregor" <Ian.Gregor@faa.gov> wrote:

> Hi Michael -  
>  
> I'd like to meet up with you before you head over to Mandalay Bay tomorrow morning to go over the  
game plan. I'm staying at the Luxor, and was wondering if we could meet for breakfast or coffee.  
>  
> Thanks,  
>  
> Ian  
>  
>  
>  
> Ian Gregor  
> Public Affairs Manager  
> FAA Pacific Division  
> (310) 725-3580 (office)  
> 



**Schedule at a Glance for Acting Administrator Huerta for Tuesday , August 7, 2012 and 30 day calendar**

Shari L Harvey    'AWA-ABA-Management-Board-List,  
'AWA-AOA-Executive-Assistants,  
9-AWA-ASH-WOC, Sharon Harrison, Trish  
Fritz, Mary Bisset, jill.mccabe,  
'AWA-ABA-Deputy-Management-Board-List,    08/06/2012 17:15  
Cecilia Harley, Fred Sampson,  
aaron.rosenthal, Deborah Lee-Urquhart, Mary  
Jefferson, deva.tucker, thomas.berry, Holly  
CTR Thomas

Acting Administrator Huerta will be attending the Association for Unmanned Vehicle Systems International (AUVSI) Conference in Las Vegas.



FAA Administrator's Schedule at a glance.pdf

Shari L. Harvey  
Executive Assistant to the Chief of Staff  
Office of the Administrator  
Federal Aviation Administration  
Office: 202-267-3940  
Shari.L.Harvey@FAA.gov

This email is intended solely for the recipient(s) named above. The information may be privileged and/or confidential. If you are not the intended recipient of this message, notify the sender immediately and delete this message. Thank you.





Re: Las Vegas   
Michael Huerta to: Ian Gregor  
Cc: Chris Rocheleau

08/06/2012 11:22

Sounds good.  
Ian Gregor

----- Original Message -----

From: Ian Gregor  
Sent: 08/06/2012 08:18 AM PDT  
To: Michael Huerta  
Cc: Chris Rocheleau  
Subject: Re: Las Vegas

Perfect. How about at the Pyramid Cafe? That seems to be the hotel's breakfast joint.

Ian Gregor  
Public Affairs Manager  
FAA Pacific Division  
(310) 725-3580 (office)  
(424) 731-0215 (cell)

Michael Huerta

From: Michael Huerta/AWA/FAA To: "Ian Gregor..."

08/06/2012 08:15:12 AM

From: Michael Huerta/AWA/FAA  
To: "Ian Gregor" <Ian.Gregor@faa.gov>,  
Cc: "Chris Rocheleau" <Chris.Rocheleau@faa.gov>  
Date: 08/06/2012 08:15 AM  
Subject: Re: Las Vegas


---

Works for me. See you then.

Sent from my iPad

On Aug 6, 2012, at 9:14 AM, "Ian Gregor" <[Ian.Gregor@faa.gov](mailto:Ian.Gregor@faa.gov)> wrote:

Thanks Michael. Does 7:30 work? I think you have to be at the Mandalay at 8:30 to meet with Paul McDuffee ...

Ian Gregor  
Public Affairs Manager  
FAA Pacific Division  
(310) 725-3580 (office)  


Michael Huerta---08/06/2012 08:10:03 AM---From: Michael Huerta/AWA/FAA To: "Ian Gregor" <[Ian.Gregor@faa.gov](mailto:Ian.Gregor@faa.gov)>.

---

From: Michael Huerta/AWA/FAA  
To: "Ian Gregor" <[Ian.Gregor@faa.gov](mailto:Ian.Gregor@faa.gov)>.  
Cc: "Chris Rocheleau" <[Chris.Rocheleau@faa.gov](mailto:Chris.Rocheleau@faa.gov)>  
Date: 08/06/2012 08:10 AM  
Subject: Re: Las Vegas

Hi Ian,

We are at the Luxor as well. We can meet for breakfast. I have copied Chris as well. Let me know what time.

Michael

Sent from my iPad

On Aug 6, 2012, at 7:33 AM, "Ian Gregor" <[Ian.Gregor@faa.gov](mailto:Ian.Gregor@faa.gov)> wrote:

> Hi Michael -  
>  
> I'd like to meet up with you before you head over to Mandalay Bay tomorrow morning to go over the game plan. I'm staying at the Luxor, and was wondering if we could meet for breakfast or coffee.  
>  
> Thanks,  
>  
> Ian  
>  
>  
>  
>  
> Ian Gregor  
> Public Affairs Manager  
> FAA Pacific Division  
> (310) 725-3580 (office)  
[REDACTED]



**AvWeek UAS special issue**

Brie Sachse to: Michael Huerta, James H Williams, Chris Rocheleau

Cc: Ian Gregor, Erik Amend, Les Dorr, Trish Fritz

08/06/2012 17:33

10

**Unmanned Aircraft Systems Special Issue  
Aviation Week & Space Technology  
August 6, 2012**

**Congress, Industry Tackle UAS Privacy Debate  
Aug 06, 2012 , p. 49**

Graham Warwick  
Washington  
Jen DiMascio  
Washington

In February, when Congress directed the FAA to open national airspace to civil unmanned aerial systems (UAS) by the end of 2015, it unleashed a flurry of regulatory and industry activity—and unlocked a closet of public and political concerns over how these systems could be used domestically.

The focus is on whether use of UAS by law enforcement threatens individual privacy. Already Congress has moved to place limits on government use of UAS. An amendment by Rep. Frank LoBiondo (R-N.J.) in the 2013 defense bill prohibits funding for UAS missions that contravene the Constitution's protection against unreasonable search and seizure.

Representing industry, the Association for Unmanned Vehicle Systems International (AUVSI) moved to head off criticism in June by releasing a code of conduct that, among other things, calls on manufacturers and users to “respect the privacy of individuals.” While welcomed, civil-liberties groups feel the simple statement does not go far enough.

“We credit them with being willing to talk about privacy at the outset,” says Chris Calabrese, legislative counsel to the American Civil Liberties Union (ACLU). “We treat this as the beginning of a dialogue on how to protect individuals' privacy, at the FAA , another agency or most likely in Congress.”

Brandishing AUVSI's code of conduct at a recent congressional hearing, Amie Stepanovich, association litigation counsel for the Electronic Privacy Information Center, said: “It's one page, front and back . . . [it's] both voluntary and unenforceable. We believe that without official action, if everything is left down to that one line on this one page, privacy will not be sufficiently

protected.”

Civil-liberties organizations see unmanned aircraft as differing from the manned aircraft now used by law-enforcement for search and surveillance in four main ways. By being significantly cheaper to buy and operate, they could become pervasive. By staying up longer, they could be used for persistent surveillance. By becoming small and quiet, they could be undetectable. And by being autonomous, they could automate surveillance.

“Our primary focus is preventing the violation of civil liberties by the government. That shapes our concerns over the use of drones,” says Catherine Crump, ACLU staff attorney.

“We are not taking a stand against use of drones, and agree they can be useful tools . . . but pervasive surveillance is now practical. Today if you travel outside, you are not subject to any meaningful surveillance. Drones threaten to change that.”

Operators and manufacturers argue that existing restrictions—in legislation and case law—on manned airborne and high-tech surveillance are sufficient safeguards on the use of UAS. They say that public concerns over unlawful surveillance by unmanned aircraft are part of the larger, unaddressed issue of privacy in the digital age.

“A search from the air is not new for law enforcement. We fly aerial searches all the time, and have done so for decades,” says Ben Miller, UAS operations manager with the Mesa County Sheriff's Office in Grand Junction, Colo. “The courts have had an opportunity to deal with this, and created all kinds of case law to direct law enforcement when a search warrant is required.”

Crump points to a recent Supreme Court ruling that GPS tracking of a suspect's vehicle for 30 days required a search warrant. “Ease with which technology facilitated surveillance is relevant [to UAS],” she says.

“To argue that persistent UAV surveillance falls under the recent ruling on GPS is a stretch,” says Miller. “To say we need special protections because it's a machine is a reach. There is always a human at the other end. With GPS tracking there isn't a human, it's periodically downloaded.”

Seeing images of UAS strikes in Pakistan, the public has visions of the police operating armed Predators, but the reality for law enforcement is quite different. Most police departments cannot afford, or have disposed of, aviation assets because of costs. Montgomery County Sheriff's Office in Conroe, Texas, initially looked at manned aircraft, but did not have the budget to purchase or maintain a \$2 million law-enforcement helicopter, says Chief Deputy William McDaniel. Instead, the county acquired a Vanguard Defense Industries ShadowHawk unmanned helicopter in 2011 for \$220,000, including a year's maintenance and training for two operators.

“The sole reason law enforcement is getting into unmanned aircraft systems is cost,” Lt. Chad Gann of the Arlington, Texas, Police Department, which operates a pair of small unmanned helicopters. “We do not plan to operate a large UAS,” he says. “The cost of manned and large

unmanned aircraft is not feasible. It costs \$50 per hour for our SUAS [small UAS] versus \$1,500 for a manned aircraft. It's all about economic efficiency and availability.”

Even small UAS are not cheap enough to deploy widely, says Gann. “We bought two remote-control helos, each costing \$100,000. That's 20 patrol cars. It's a lot of money.”

But SUAS do offer dramatically lower operating costs than manned aircraft. Mesa County has been operating a Draganflyer X6 for a couple of years, says Miller. The battery-powered rotorcraft has only 10-15 min. of endurance, but “it does great job of aerial photography,” he says. “When a kid destroyed a lawn at a school, causing \$10,000-15,000 damage, it cost us just \$25 to take pictures.”

Mesa's UAS program has grown to include a fixed-wing Falcon UAV. “It's a good search-and-rescue tool,” a mission that would otherwise require manned aircraft, says Miller. “We had fixed-wing aerial surveillance in the past, but it got too expensive, at \$60,000 for an engine overhaul.”

While more police departments want small UAS, obtaining FAA permission to fly them remains a hurdle. Montgomery County applied for its certificate of authorization (COA) in 2010 and “it was a number of months before the application was approved,” says McDaniel. “To date, we have only had one opportunity to use the ShadowHawk for an operational mission, but the FAA denied our request for an emergency COA, citing there had to exist a 'loss of life or potential loss of life' before they would approve it.”

To get emergency approval from the FAA, an operator must have an existing COA, and the specific mission must involve “a significant chance of loss of life,” says Miller.

Arlington “is only five law-enforcement agencies with COAs to fly SUAS,” says Gann, but its program is still in the test and evaluation phase. “We've applied to become fully operational,” he says. Multiple COAs allow the UAS to be flown below 400 ft. across the city. “We want a separate track through the FAA for SUAS used for law enforcement,” he says. “There is not an instruction manual. We are making precedent as we go along.”

McDaniel blames the FAA for problems in gaining approval for operational UAS missions. It has “no real concept of the needs of public-safety agencies; staffers do not have the law enforcement, fire or emergency management background to be able to relate to the missions of these agencies,” he says. “If UAV operations remain under the oversight and control of the FAA, domestic UAV operations will continue to be severely hampered or limited to the point of being useless.”

It would be more appropriate for the Office of State and Local Law Enforcement in the Department of Homeland Security to be tasked with federal oversight of UAS operations, McDaniel argues.

The FAA also finds itself at the center of the storm over privacy. “Our concern is there is so little openness and transparency about what is going on,” says Jennifer Lynch, staff attorney with the

Electronic Frontier Foundation, which petitioned the FAA for a list of UAS COAs. “They took forever and were less than forthcoming. The FAA is pretty transparent, it's unusual and surprising that so little information is available on UAS,” she says. “If they had more information, the public would not be so scared.”

“We have urged FAA to take into account privacy as it promulgates legislation,” says Crump. The agency says privacy is not within its charter, but “the FAA has interpreted its mandate widely in the past, in regulating the impact of air transport on the environment,” she says. “And Congress has the authority to change the FAA's mandate.”

### **Civil GPS Spoofing Tests Underline UAS Vulnerability** **Aug 06, 2012 , p. 51**

Graham Warwick  
Washington  
Jen DiMascio  
Washington

A video of a small unmanned helicopter dropping from hover like a stone, its operator unaware control has been hijacked, threatens plans to open civil airspace to UAS (unmanned aerial systems) by exposing the vulnerability of GPS to counterfeit signals, or spoofing.

Although the weaknesses of civil GPS have implications beyond aviation—threatening the energy, financial and telecommunications sectors—they have come into sharp focus since Congress directed the FAA to open national airspace to UAS by 2015 (see p. 52).

Several lawmakers seemed to be having second thoughts during a July 18 hearing of a House homeland-security subcommittee, as University of Texas (UT) at Austin Assistant Prof. Todd Humphreys described tests that showed how vulnerable a civil UAS's GPS navigation system is to hacking.

For its demonstration, first in a football stadium and then for the Department of Homeland Security (DHS) at White Sands Missile Range, N.M., UT's Radionavigation Laboratory used Adaptive Flight's Hornet Mini, an \$80,000 unmanned helicopter typical of UAS used by law enforcement.

At White Sands, the operator commanded the aircraft to hover at 50 ft., and a spoofer on a hilltop half a mile away began transmitting weak counterfeit GPS signals, “achieving meter-level alignment with the authentic signals at the location of the UAV's GPS antenna,” says Humphreys.

“The spoofer then rapidly increased its counterfeit signal power, bringing the UAV under its control” by hijacking the GPS receiver's tracking loops. By inducing a false upward drift in the UAS's perceived location, the spoofer fooled the onboard flight controller into commanding a

dive. The □UAS “came straight down like an elevator in a shaft, entirely under control of the remote hacker.” At about 10 ft. above the ground, a safety pilot took manual control .

The Hornet Mini is fairly sophisticated and representative of larger commercial UAS, with a navigation system built around a Kalman filter combining data from an altimeter, magnetometer and inertial measurement unit as well as a civil GPS with receiver autonomous integrity monitoring (RAIM) to identify and discard signals that appear to be outliers. “Standard RAIM is ineffective against GPS spoofing because it generates a fully self-consistent ensemble of spoofing signals; there are no outliers,” says Humphreys.

Spoofing did not touch the aircraft's command-and-control or payload data links (which could be encrypted), only the unprotected civil GPS, and the UAS operator was unaware of the hijack. “The remote operator was in contact with the UAV the entire time, but nothing appeared wrong to his sensors.”

Adaptive Flight CEO Wayne Pickell says the Hornet Mini has a “patent-pending GPS-denied operational mode” that was turned off for the UT demo, but adds that the company “is proud to be working with Dr. Humphreys and his team in their efforts to address GPS system vulnerabilities due to spoofing.”

Sophisticated spoofers are not easy to build, but GPS simulators “can do almost everything that we did, and are readily available,” says Humphreys. “So I am worried it could be a weapon in the arsenal of organized crime, state actors or terrorists.”

“ Spoofing is not a new issue,” says Michael Toscano, CEO of the Association for Unmanned Vehicle Systems International (AUVSI). “[It] has implications for any technology that depends on GPS for guidance and timing, whether it is manned or unmanned aircraft, your cellphone or your car.”

AUVSI believes military anti-spoofing technology will move into the civil market. Humphreys is doubtful, believing these so-called Saasm (selective availability anti-spoofing module) receivers would drive up the price of small UAS and create the logistical headache of distributing cryptographic keys while keeping them out of the wrong hands. But Rockwell Collins argues its MicroGram miniature protected GPS is both tamper-proof and relatively inexpensive. “We think there is a technical solution,” says Bobby Sturgell, vice president of Washington operations.

Despite his spoofing demo, Humphreys is “not terribly worried”—for now. Weighing only 13 lb., the UAS used would not cause much damage if hijacked and crashed. And it is not clear a hacker could do more. “It's not terribly easy to control it once you've got it,” he says. “The question we have been asking ourselves is what actually could be done after you've captured it?”

But Humphreys' “nightmare scenario” is to look forward three or four years “to where we have adopted UAVs into national airspace without addressing this [ vulnerability ], and now the problem is scaling up so we have heavier UAVs. The FAA has predicted that, by 2020, there could be 30,000 of these flying in our airspace . That does concern me.”

Humphreys is recommending that a spoof-resistant navigation system be required in UAS exceeding 18 lb. The U.S. Air Force is prepared to modify civil GPS signals with a cryptographic authentication signature, he says, but lacks the funds. "I believe it would fall to the DHS to fund something like this. I can't say I'm terribly optimistic."

A "grassroots" approach to building anti-spoofing into civil GPS may be more practical. "There are reasonable techniques you can bake into the GPS receivers and navigation systems of UAVs. While they won't prevent sophisticated attacks, they would make them much harder," he says. "The fact is, anti-spoofing is hard. There's no quick and easy and cheap solution, but there are cost-effective measures we can take in the short term."

**Communities Vying For FAA Test Site Designation**  
**Aug 06, 2012 , p. 52**

Jen DiMascio  
Washington

After months of sharpening their bids and building teams, a U.S.-wide competition for the FAA to designate six sites to test UAS (unmanned aerial system) technologies in civilian airspace is about to begin.

Across the country, governors, lawmakers, business development organizations, airports and companies are sharpening bid proposals that the FAA expects to issue "soon," with an eye toward choosing the winning teams by year-end. Recent legislation requires the FAA to integrate UAS into the civilian airspace by Sept. 30, 2015.

All together, the FAA is looking for the test sites to examine a menu of capabilities including a conventional takeoff and landing, high-speed flight, maritime, operations at extremely high altitudes and evaluation of dissimilar aircraft in multiple altitude structures. Along with that, the sites should be able to tap into a UAS developer or manufacturer with affordable access to vertical-takeoff-and-landing capabilities; "novel" control, propulsion and fuel systems; stealth technologies and slow-speed flight, as well as reduced climb rates. The combination of sites should address interference issues and low-altitude operations, and be able to test for specific civilian UAS missions such as agricultural or environmental monitoring.

For the communities from Florida to Washington state and all points in between, the test sites represent an economic opportunity that comes along once in a generation.

"We need more jobs and we need high-tech jobs," says Al Palmer, director of the University of North Dakota's Unmanned Aerial Systems Center of Excellence and the chair of the North Dakota airspace and innovation team. "UAS seems to be the answer to that." North Dakota has plenty of selling points for the FAA. Northrop Grumman's Block 40 Global Hawks are stationed there. A National Guard unit and Customs and Border Patrol operate there, and the state is investing in unmanned aircraft, says Palmer. The state's senators are so engaged they have been meeting with the FAA's acting administrator, Michael Huerta.



Like the FAA when it comes to discussing the release date for the request for proposals, localities are sometimes vague about the specifics of their individual proposals. "It's like making secret chili," says Palmer. "You're worried about the recipe."

But in the months to come, the FAA's decision will be complicated by the fact that states across the nation have good cases to make. Detroit, still reeling from the 2008 recession, is hoping to turn past disinvestment into a positive. In a comment to the FAA about the test sites, the Detroit Aircraft Corp. cited the area's "urban environments with a relatively sparse population to infrastructure ratio." Additional selling points for Detroit include its proximity to the Canadian border and access to the automotive industry. Arizona, which stands to lose federal funding in the defense spending downturn, could draw on that infrastructure, and multiple sites within the state are competing for the prize.

Other areas will draw on a nearby NASA or military presence to make the case for a new test site. That includes a number of sites in Ohio, where NASA and the Air Force Research Lab have a presence. Officials in Huntsville, Ala., are also marketing the city's space and military credentials, given the Army's experience at Redstone Arsenal with battlefield UAS and the area's proximity to Stennis Space Center in Mississippi.

At the same time, Palmer anticipates regional teaming may be the way to go, titling the proposal "Northern Plains," to include North Dakota, South Dakota, Montana and Minnesota.

New Mexico State University is home to the FAA's only authorized flight-test center for UAS. Based on his experience, Steven Hottman, director of the university's UAS Technical Analysis and Applications Center, is fielding questions from around the country about the sites.

Even with predictions of a \$355 million market for civilian-use UAS by 2020, Hottman cautions communities about making too much of the potential economic payoff.

Hottman says many of the economic development organizations are "projecting a large number of unidentified users," that could lead to an influx of cash and economic opportunity. "And yet, there are really no current monies," he notes.

Communities and participating private companies will have to make their own investments, as the FAA has no funding to back the sites.

By the same token, Hottman says he is hearing from organizations that have a strong focus. The fights are already intense, taking place within states and across borders. "There is a tremendous amount of interest," he says.

#### Mandate for UAS Test Sites

- Safely designate airspace for integrated manned and unmanned flight operations in the National Airspace System.
- Develop certification standards and air traffic requirements for unmanned flight operations at

testranges.

- Coordinate with and leverage the resources of NASA and the Defense Department.
- Address both civil and public unmanned aircraft systems.
- Ensure that the program is coordinated with the Next Generation Air Transportation System.
- Ensure the safety of unmanned aircraft systems and related navigation procedures before they are integrated into the National Airspace System.

Source: FAA

### **NASA Flight-Tests Smartphone Safety System In UAV**

**Aug 06, 2012 , p. 39**

Guy Norris

Los Angeles

As any military planner hoping to introduce new capabilities knows, breaking the cost paradigm in these days of tight budgets is every bit as important as proving the technology itself.

Improving flight safety, and preventing costly ground collisions both in terms of human life and expensive aircraft—manned or unmanned—is one such area of concern. No wonder then that positive trials of a novel, low-cost, anti-collision safety system that has a potential application on everything from small unmanned air vehicles to fifth-generation fighters is attracting serious attention.

Tests just completed by NASA in California's Mojave Desert, with support from the U.S. Defense Department, have shown that a small UAV (SUAV) can automatically protect itself from ground collisions using terrain data and control software stored onboard with nothing more sophisticated than a smartphone. The automatic ground collision avoidance system (Auto-GCAS) uses precise navigation, performance and digital terrain data in the phone to constantly monitor position relative to known obstacles.

After assessing that the red and yellow trajectories will not clear terrain, Auto-GCAS selects the green trajectory as the escape maneuver. Credit: NASA

Auto-GCAS is designed to intervene as a last resort, automatically recovering an aircraft when it senses that a ground collision is imminent and the pilot is not taking action. However, unlike earlier, cruder systems, Auto-GCAS is also designed to avoid nuisance “fly-ups” or false alarms that interfere with the intended mission.

Developed under the original Automatic Collision Avoidance Technology (ACAT) program, Auto-GCAS was developed and flight tested in 2010 on an F-16D by NASA Dryden Flight Research Center and the Air Force with support from the Office of the Undersecretary of Defense and Lockheed Martin . The system has been flight-tested by the Air Force at Edwards AFB, Calif., for planned incorporation in the M6.2+ operational flight program update. The new software will be introduced into squadron service with Block 40-52 USAF F-16s from 2013

onward.

The system passed initial development testing with “flying colors,” says Mark “Tex” Wilkins, senior aviation safety analyst for the Defense Safety Oversight Council. “There were a few minor things, but overall it performed as expected and is one step closer to being operationally fielded and saving lives and aircraft.”

The move to fly a version of the system on a UAV marks part of a wider effort to spread the safety benefits to more platforms. “The SUAV project opens up a lot of doors to non-digital aircraft and non-fighter aircraft, including those where space and weight is limited,” says Wilkins. Theoretically, by managing the safety system as a simple add-on to the avionics suite rather than embedding it at cost-prohibitive lengths in the flight-control computer, “any Defense Department aircraft becomes Auto-GCAS compatible. Now we have to figure out what comes next,” he adds.

“It was a NASA goal to transition the system to a UAV and at the same time see if we could put it on a smartphone,” says the agency's Auto-GCAS project manager, Mark Skoog. “We're using raw GPS data to drive this algorithm, and we have the entire globe on the phone,” he adds.

Tests have been conducted using several 9-ft. 8-in. wingspan, radio-controlled hobby Super Flyin' King model aircraft dubbed the Droid (Dryden Remotely Operated Integrated Drone). Primary objectives included integrating the safety device without increasing the weight of the UAV, demonstrating a system that functions autonomously during a lost link with a ground station and proving that the GCAS algorithm can be run using a Motorola Droid X phone. For the tests, the phone used the open Android operating system architecture, modified to run the Dryden-developed Auto-GCAS software.

The system takes advantage of data-compression techniques developed for the F-22's avionics architecture. “We were able to go to a 2,000:1 compression ratio,” says Skoog who adds that by converting the Earth's surface into a tile-based elevation database, more than 300 gigabytes were compressed to 145 megabytes.

For the Phase 1 test, the phone did not fly on the UAV but was instead integrated into the ground station and connected to the aircraft's autopilot through an interface unit via a command-and-control link. The system was tested in rugged desert terrain called 'GCAS valley,' a restricted area of Edwards AFB known as the R-2508 Complex. The UAV was flown up a box canyon by a pilot in the ground station; a safety pilot monitored the test from close by.

“The UAV has different, multitrajectory escape maneuvers than an F-16, which goes much faster, looks 18,000 ft. ahead and pulls straight up,” says Skoog. Aimed at the terrain by the pilot, the vehicle executed automated lateral escape maneuvers using algorithms modified to reflect turn rates and trajectories based on the performance of a General Atomics MQ-9 Predator. Following each escape, the safety pilot resumed control. As with evaluation of the Auto-GCAS on the F-16, which involved reruns of incidents that had ended in the loss of the aircraft and pilot, SUAV test scenarios also included recreations of known UAV mishaps.

“We had real failures inflight such as communications failure between the hardware and loss of data,” says Skoog. “The program was never intended to do the sort of integrity monitoring that was needed for the F-16.” Overall, however despite the challenges of the terrain on communications with the UAV, the tests were fruitful, he says. “We have exercised the multi-trajectory algorithms and everything went exceedingly well. We sometimes saw it fly unexpected trajectories and [wondered why]. Then we'd see the data and discover what caused it to fly a particular trajectory.”

For the second phase, the phone was integrated directly onboard with a relatively unsophisticated Piccolo 2 autopilot unit. NASA is now analyzing data from the final series of tests, which concluded in late May with Flights 20 and 21. These included checks of the final software to evaluate failure-mode logic and methods for measuring the influence of terrain on local winds and trajectory projections. It also included nuisance evaluations of single versus multi-trajectory options.

On Flight 20, the UAV was flown over the ridge at the top of the valley with and without the multi-trajectory escape paths enabled. Skoog reports that ridge crossings “were accomplished with multi-trajectory on, but under pilot control, in both directions down to 100 ft, above ground limit with no fly-up activations. Multi-trajectory was then turned off, allowing only a straight trajectory.” The subsequent ridge crossings triggered several fly-ups, which indicated that “single-trajectory would have been more nuisance-prone than multi-trajectory,” he adds.

The final test, Flight 21, covered further collision avoidance performance evaluation as well as seeing how prone to nuisance fly-ups the UAV would be while patrolling the valley. In all, the final tests saw five mountainous terrain collision avoidance fly-ups executed and ridge crossings conducted. NASA says the last leg of the trials yielded convincing evidence that the availability of multi-trajectory escape options provided nuisance-free flight improvements over single-trajectory.

Further evaluations of the Auto-GCAS system are planned as preparations continue for eventual integration into aircraft such as the F-35 Joint Strike Fighter, as well as into a possible range of UAVs and some fixed-wing, piloted aircraft, the names of which have not yet been released.





Daily Broadcast for August 6, 2012

FAA Broadcast to  
Sent by: FAA Broadcast

08/06/2012 09:35

g - he A is developing a way to better protect air traffic systems from the impact of solar flares.

Las Vegas convention puts drones on big stage – Washington Times

[Read Story »](#)

[All Daily Media Stories »](#)

**FAA NEWS**

Important updates, agency newsletters, and

**IdeaHub**

5,732 Ideas

76,046 Ratings

information for all employees, refreshed daily.

[Go Now »](#)

**19,594 Comments**

[Go Now »](#)

**Federal Aviation  
Administration**

[USA.gov](#) [DOD Ignorant](#) [MTEAA](#) [Board AV](#) [Privacy Policy](#)



POLITICO's Morning Transportation : Mica hits Amtrak by eating at McDonald's - Dem senator blocking EU emissions bill - MWAA criticism mounts - Polls, endorsements in three key T & I races - Get T & I news from POLITICO Pro

Morning Transportation to Michael Huerta  
Please respond to "POLITICO subscriptions "

08/06/2012 09:35

By Adam Snider

With Kathryn A. Wolfe and Jessica Meyers

**MICA'S LOVIN' IT:** House T&I Chairman John Mica stayed in Washington a day longer than most of his House colleagues. It wasn't for a fancy fundraiser or a last-minute meeting - it was for a McDonald's hamburger. Standing outside a McDonald's just blocks from the Capitol, with TV cameras and reporters circled around, he again hit Amtrak for its money-losing food and beverage service. Thursday's hearing wasn't enough - Mica said he might even ride the train "with a sign that says, 'Don't eat the food, it adds to deficit spending.'" And when a train went by on the nearby tracks, Mica yelled "How much waste is going by? Please don't buy the hamburgers!" Adam has the story: <http://politi.co/NTY9Jw>

[REDACTED]

**Attention-grabber:** Flaks, now this is how to get our attention. From the press advisory: "Come see Rep. Mica eat a \$1 burger and have a \$1 soda at McDonald's."

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**UAVs:** House Majority Whip Kevin McCarthy and eight other House members write FAA head Michael Huerta over the integration of unmanned aerial systems into the national airspace. The pols are worried about both the 2012 deadline and how exactly the agency is defining "integration." Read it: <http://bit.ly/R4oTpN>

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**MADE IN AMERICA:** The Vehicle Production Group has asked the FTA to abolish a waiver allowing other companies to bypass Buy America requirements for minivans and minivan chassis. VPG says it now manufactures parts that meet those regulations. Read more, from the Federal Register: <http://l.usa.gov/NbeNAU>

[REDACTED]

[REDACTED]

Go to POLITICO Morning Transportation Now >>  
<http://www.politico.com/morningtransportation>

=====  
2012 POLITICO, LLC  
POLITICO Morning Transportation.

[REDACTED]

Larry Abramson, National Security Correspondent for NPR, is doing a UAS story based on this week's AUVSI conference. The story should air Monday afternoon. He's focusing on the small UAS rule, the emerging market, and the general excitement over commercial use of the technology.

Ben Wolfgang with *The Washington Times* inquired about funding for the UAS six test sites. On background, we said: Congress required the FAA to identify the six test sites through the FAA Modernization and Reform Act of 2012 and in the National Defense Authorization Act. The FAA has not been provided any specific funding for the test sites. Selected operators will be responsible for expenses related to the operation of their respective test sites."

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



[REDACTED]

[REDACTED]

[REDACTED]

The *Las Vegas Review-Journal* asked if our upcoming Unmanned Aircraft Systems (UAS) rule will look at integrating large vehicles such as the Global Hawk into the National Airspace System (NAS). We explained the rule pertains to small UAS. We said the six test sites we're establishing will look at how to integrate all types of UAS into the NAS. The reporter was at the Association of Unmanned Vehicle Systems International conference in Las Vegas this week and attended a presentation that FAA UAS integration chief James Williams made Wednesday.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Laura J. Brown  
Deputy Assistant Administrator  
for Public Affairs  
202-267-3455 W  
[REDACTED]





**Fw: Blue Oyster Cult**  
Michael Huerta to: Ann Sowder

08/09/2012 10:32

Chris sent this over. It was one of the stories about my Las Vegas speech.

----- Forwarded by Michael Huerta/AWA/FAA on 08/09/2012 10:31 AM -----

From: Chris Rocheleau/AWA/FAA  
ADA-002, Senior Advisor  
To: Michael Huerta/AWA/FAA@FAA, David Weingart/AWA/FAA@FAA, Brie Sachse/AWA/FAA@FAA  
Date: 08/08/2012 06:29 PM  
Subject: Blue Oyster Cult

---

One of the best headlines of yesterday's trip:

**FAA Chief: Don't fear the Reapers (or Predators, Global H**  
At the unmanned aircraft expo, FAA administrator promises drone safety, privacy.



**Re: Blue Oyster Cult** 

**Michael Huerta** to: Chris Rocheleau, David Weingart, Brie Sachse

08/08/2012 21:29

Where did you find that?  
Chris Rocheleau

----- Original Message -----

**From:** Chris Rocheleau

**Sent:** 08/08/2012 06:29 PM EDT

**To:** Michael Huerta; David Weingart; Brie Sachse

**Subject:** Blue Oyster Cult

One of the best headlines of yesterday's trip:

# FAA Chief: Don't fear the Reapers (or Predators, Global H

At the unmanned aircraft expo, FAA administrator promises drone safety, privacy.



**Fw: FAA Press Update**

Brie Sachse

Michael Huerta, David Weingart, Kathryn  
Thomson, Peggy Gilligan, James H Williams,  
John Hickey, Mary Bisset

08/09/2012 17:31

One more...

Ben Wolfgang with *The Washington Times* inquired about funding for the UAS six test sites. On background, we said: Congress required the FAA to identify the six test sites through the FAA Modernization and Reform Act of 2012 and in the National Defense Authorization Act. The FAA has not been provided any specific funding for the test sites. Selected operators will be responsible for expenses related to the operation of their respective test sites."

----- Forwarded by Brie Sachse/AWA/FAA on 08/09/2012 05:28 PM -----

From: Laura J Brown/AWA/FAA  
AOC-002, Office of Public Affairs  
To:  
Date: 08/09/2012 05:17 PM  
Subject: FAA Press Update

[REDACTED]

[REDACTED]

[REDACTED]

The *Las Vegas Review Journal* attended a presentation that chief of the UAS Integration Office James Williams gave at the Association of Unmanned Vehicle Systems International conference in Las Vegas Wednesday. The reporter asked us to confirm Williams' response to a question about privacy issues by listening to an audio recording he made of the presentation. We

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Laura J. Brown  
Deputy Assistant Administrator  
for Public Affairs  
202-267-3455 W  
[REDACTED]



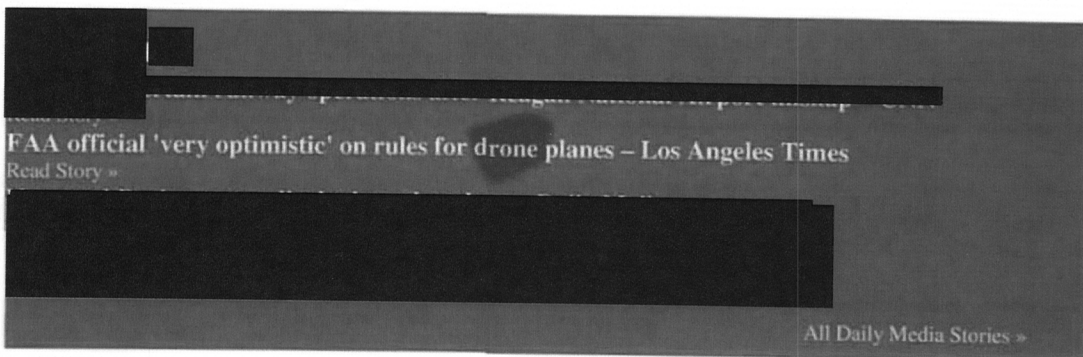
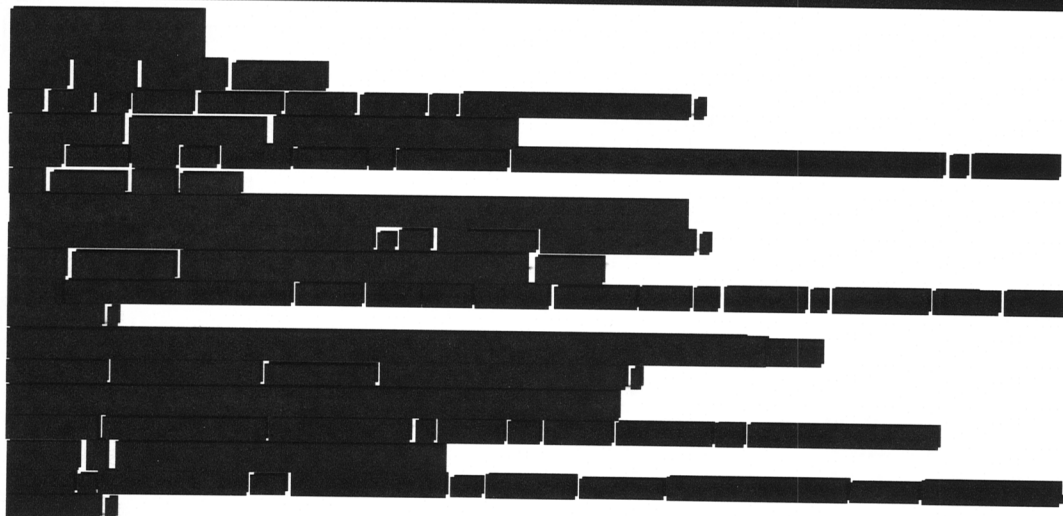
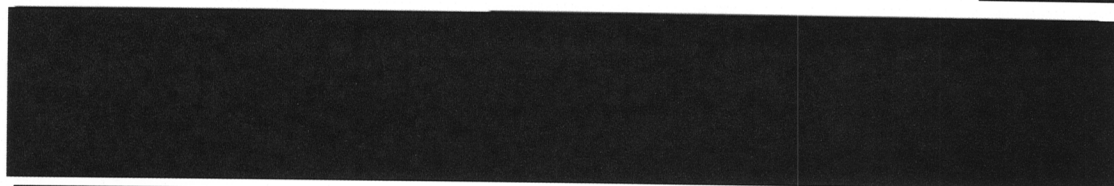
Daily Broadcast for August 8, 2012

FAA Broadcast to:

Sent by: FAA Broadcast

08/08/2012 09:20

# My**FAA**



FAA official 'very optimistic' on rules for drone planes – Los Angeles Times

[Read Story »](#)

[All Daily Media Stories »](#)

**FAA NEWS**

**IdeaHub**

5,740 Ideas

Important updates, agency newsletters, and  
information for all employees, refreshed daily.

[Go Now »](#)

**76,247 Ratings**

**19,711 Comments**

[Go Now »](#)

**Federal Aviation  
Administration**

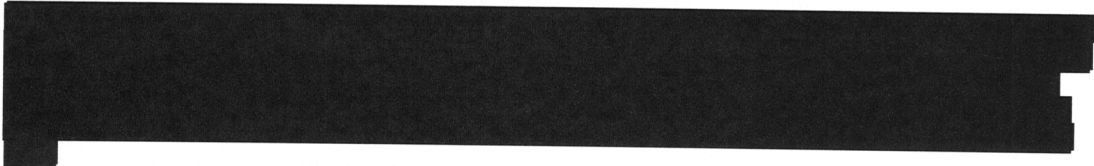
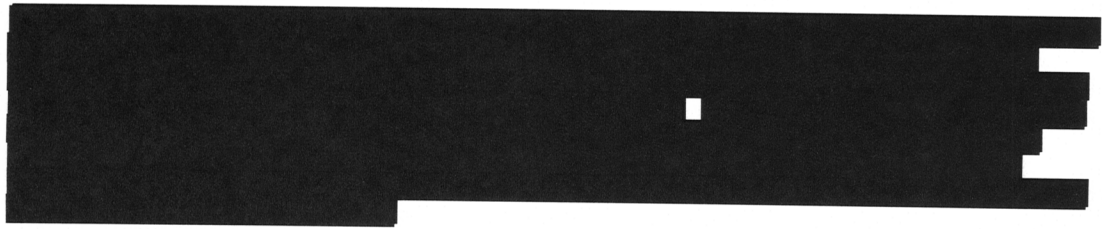
[USA.gov](#) [DOT Home](#) [NPSA](#) [EASA](#) [Privacy Policy](#)



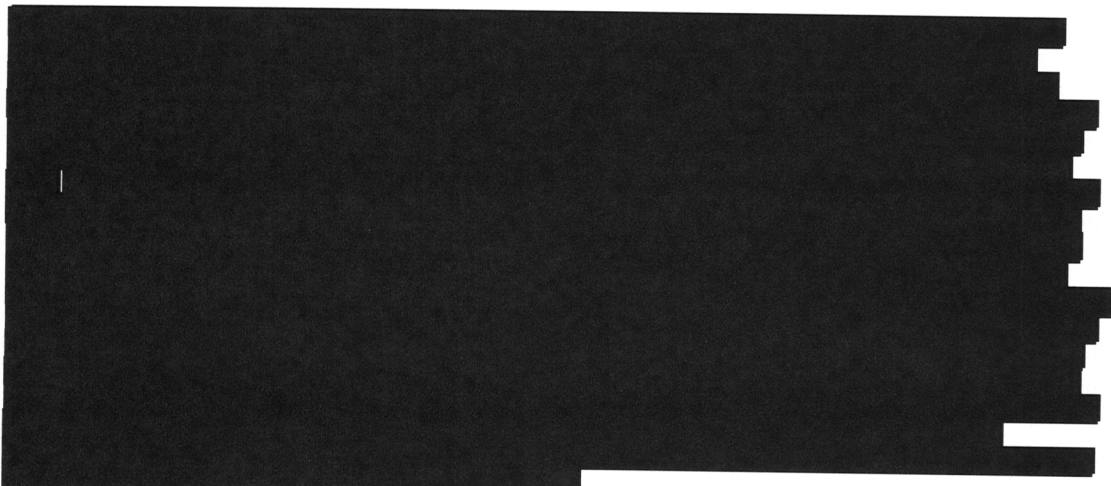
FAA Press Update

Laura J Brown to

08/07/2012 17:56



FAA Administrator Michael Huerta was a keynote speaker at the Association for Unmanned Vehicle Systems International (AUVSI) conference Tuesday morning in Las Vegas. After delivering prepared remarks, the Administrator fielded questions from three trade publications: National Defense Magazine, The Business of UAS and Small Unmanned Aircraft System News. The questions were: what will the FAA do if safety mechanisms aren't in place by the Congressional deadline for integrating UAS into the National Airspace System? Why did the FAA not meet the Congressional timeline for issuing requests for proposals for establishing UAS test sites? Why weren't small businesses on the small UAS Aviation Rulemaking Committee (ARC). Administrator Huerta said we're continuing our efforts to safely integrate unmanned aircraft systems by 2015. He said we will meet our statutory obligations in a thoughtful, careful manner that ensures safety. He also said we are evaluating public comments on the test site selection process and expect to ask for proposals to manage these sites soon. Concerning small business representation on the ARC, he noted that everyone including small businesses will have an opportunity to comment on the proposed rule when we release it. Larry Abramson from National Public Radio came over to introduce himself to the Administrator after the Q&A but did not conduct an interview. An NPR photographer took a picture of the Administrator for their website.



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



**AUVSI**

Phyllis Howard to: Michael Huerta

08/07/2012 22:48

Sir,

It was great to see you today, prior to your keynote address.

After our recent meeting, I met with Mr. Williams to offer my UAS/RPA relationships to leverage. There has been tremendous development on my side (from DoD) and would like to quickly bring you up to speed. Might you have 15 minutes anytime soon to catch up? I will be happy to share the perception in the AUVSI room with regard to test site evaluation and additional assistance I will bring to FAA through DoD.

Again, Sir, I appreciate the opportunity to communicate with you and let me know what's most convenient for your schedule.

v/r,

Phyllis



**Schedule stuff**

**David Weingart**

AOA-002, Office of the Chief of Staff

Cc: Trish Fritz, Sharon Harrison

to Shari L Harvey

08/07/2012 03:01 PM

[REDACTED]

And for next Monday, we probably need to move the management team meeting...Peggy and I have a WH meeting to talk about the UAS SIR from 11-12:45. Michael is out, so I'm hosting the management team meeting. Please coordinate with Sharon on that when she's back tomorrow.

Thanks!

David



Las Vegas

Chris Rocheleau to: Brie Sachse, Mary Lou Pickel, David Weingart, Trish Fritz, Sharon Harrison, Cecilia Harley, Shari L Harvey

08/07/2012 09:15 PM

Cc: "Ian Gregor"

Sorry for the delay.. we were moving fast today.

The speech went very well, and he received a number of compliments on it after (really nice job). The message was on point and he stuck close to the script. He did add very minor edits and stated that the integration effort would be "unbelievably complicated" after "...consensus on a path forward for our aviation system is an equally important task." but I think it's fine to post "as prepared for delivery". Q/A was fairly short and benign. Questions were:

- legislation was quite specific on what the FAA needs to accomplish, what happens if safety measures aren't in place when the deadlines approach?
- you said the SIR would be out "soon"... when is soon?
- are you engaging the FCC on NAS integration?
- small businesses haven't been part of the UAS ARC, if you want full engagement, will you engage them going forward?

And that was pretty much it. There were some questions from NPR during a one-on-one about timing and challenges, but technically was "on background".

The meeting the Nevada's UAS team interested in having a UAS site was fine. They had a polite, direct, and informative pitch. A good exchange was had, and they planned to seek out Jim Williams as a follow-up.

The brown bag at the tower/tracon was great. Motivated team, and the folks from Reno (telcon) along with Airport Director and NBAA rep participated. Questions included:

- are NextGen fundamentals coming along? the workforce here is ready
- what about your nomination and what's to be expected for the next few months?
- LIDAR, got to have it and would like your support... it can make the difference and we're ready
- also need multi-lateration and are ready to follow the Colorado example
- Airport Director agreed and is ready to spend millions
- RNAV is working well, and want a continued emphasis on delivery
- what's going on with WE and are we disengaging because of funding or other pressures?
- conferences... is it all over? They are valuable to us in many ways

Overall a very hectic day but a lot accomplished. Thanks for everyone's great work.  
cr

Sent from my iPad